WHAT IS CLAIMED:

Sub A1

1. A method for immobilizing an anti-thrombogenic material into a coating posited on a surface of an implantable medical device within the mammalian body, comprising:

preparing a base coat mixture for application to the surface of the medical device;

polymerizing the base coat mixture to form a base coat layer on the medical device; and

immobilizing the anti-thrombogenic material directly to chemically functional groups within the base coat layer on the surface of the medical device.

2. The method of claim 1, wherein the medical device is a stent.

3. The method of claim 1, wherein the base coat mixture is applied to the outside surface of the medical device.

4. The method of claim 1, wherein the base coat mixture includes a binding material, a grafting material, a photoinitiator, and a solvent.

5. The method of claim 4, wherein the binding material of the base coat is selected from the group consisting of polyaziridine resin compounds, polycarbodiimide resin compounds, aldehyde compounds, oxirane compounds, acetoacetoxy compounds, and isocyanate compounds.

6. The method of claim 5, wherein the binding material of the base coat layer is cinnamaldehyde.

7. The method of claim 4, wherein the grafting material of the base coat is selected from the group consisting of vinyl, acrylate and allyl compounds.

8. The method of claim 7, wherein the grafting material of the base coat layer is polyurethane acrylate.

9. The method of claim 7, wherein the grafting material of the base coat layer is polymerized by irradiating the grafting material with ultra-violet (UV) radiation for about eight to ten minutes.

10. The method of claim 4, wherein the solvent is selected from the group consisting of ester and ketone compounds.

11. The method of claim 1, wherein the anti-thrombogenic agent is heparin.

12. The method of claim 1, wherein heparin is immobilized by a reaction between an aqueous heparin solution and chemically functional groups within the base coat layer on the surface of the medical device.

13. The method of claim 12, wherein the aqueous heparin solution is selected from the group consisting of unfractionated heparin and N-partially desulfated heparin.

14. The method of claim 13, wherein the reaction between the aqueous heparin solution and the chemically functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 7.0.

15. A method for end-immobilizing an anti-thrombogenic material into a coating posited on a surface of an implantable medical device within the mammalian body, comprising:

preparing a base coat mixture for application to the surface of the medical device;

polymerizing the base coat mixture to form a base coat layer on the medical device; and

end-immobilizing the anti-thrombogenic material directly to chemically functional groups within the base coat layer on the surface of the medical device.

16. The method of claim 15, wherein the anti-thrombogenic material is heparin.

17. The method of claim 15, wherein heparin is end-immobilized by a reaction between an amine-terminated heparin and chemically functional groups within the base coat layer on the surface of the medical device.

18. The method of claim 17, wherein the reaction between amine-terminated heparin and chemically functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 7.0.

19. A method for immobilizing an anti-thrombogenic material into a coating posited on a surface of an implantable medical device within the mammalian body, comprising:

preparing a base coat mixture for application to the surface of the medical device;

polymerizing the base coat mixture to form a base coat layer on the medical device;

performing a reaction between the base coat layer and excess amine-terminated polyethylene glycol;

rinsing the base coat layer with water; and

performing a reaction between the anti-thrombogenic material and amine-terminated polyethylene glycol on the surface of the medical device.

20. The method of claim 18, wherein the reaction between the excess amine-terminated polyethylene glycol and the chemically functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 7.0.

21. The method of claim 20, wherein the excess amine-terminated polyethylene glycol is $PEG(NH_2)_2$.

22. The method of claim 21, wherein the concentration of $PEG(NH_2)_2$ is about 0.01mg/ml to 20mg/ml.

23. The method of claim 19, wherein after completion of the reaction between the excess amine-terminated polyethylene glycol and the chemically functional groups within the base coat layer, the medical device is rinsed with water.

24. The method of claim 19, wherein the anti-thrombogenic material is unfractionated heparin.

25. The method of claim 24, wherein unfractionated heparin is reacted with amine-terminated polyethylene glycol and a water-soluble carbodiimide on the surface of the medical device for the immobilization of heparin thereon.

26. The method of claim 25, wherein the reaction between unfractionated heparin and amine-terminated polyethylene glycol with a water soluble carbodiimide on the surface of the medical device runs for about two to six hours at about room temperature and about pH 4.5 to 7.5.

27. The method of claim 19, wherein the anti-thrombogenic material is N-desulfated heparin.

28. The method of claim 27, wherein N-desulfated heparin is reacted with amine-terminated polyethylene glycol and a water-soluble carbodiimide on the surface of the medical device for the immobilization of heparin thereon.

29. The method of claim 28, wherein the reaction between N-desulfated heparin and amine-terminated polyethylene glycol with a water soluble carbodiimide on the surface of the medical device runs for about two to six hours at about room temperature and about pH 4.5 to 7.5.

30. A method for immobilizing an anti-thrombogenic material into a coating posited on a surface of an implantable medical device within the mammalian body, comprising:

preparing a base coat mixture for application to the surface of the medical device;

polymerizing the base coat mixture to form a base coat layer on the medical device; and

performing a reaction between a coupling solution and chemically functional groups within the base coat layer of the device surface.

31. The method of claim 30, wherein the coupling solution is heparin and OH-PEG-NH_2.

32. The method of claim 31, wherein the concentration of the coupling solution is about 0.01mg/ml to 20mg/ml.

33. The method of claim 31, wherein the reaction between the coupling solution and chemically functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 8.0.

34. A method for immobilizing an anti-thrombogenic material into a coating posited on a surface of an implantable medical device within the mammalian body, comprising:

preparing a base coat mixture for application to the surface of the medical device;

polymerizing the base coat mixture to form a base coat layer on the surface of the medical device; and

immobilizing the anti-thrombogenic material directly to chemically functional groups within the base coat layer on the surface of the medical device.

35. The method of claim 34, wherein the anti-thrombogenic material is surfactant-bound heparin.

36. The method of claim 35, wherein the surfactant-bound heparin includes at least one of benzalkonium heparin and TDMA-heparin.

37. The method of claim 35, wherein the surfactant-bound heparin is immobilized by a reaction with cinnamaldehyde on the surface of the medical device.

38. The method of claim 37, wherein the reaction between the surfactant-bound heparin and chemically functional groups within the base coat layer on the surface of the medical device runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 7.0.

39. A method for immobilizing an anti-thrombogenic material into a coating posited on a surface of an implantable medical device within the mammalian body, comprising:

preparing a base coat mixture for application to the surface of the medical device;

polymerizing the base coat mixture to form a base coat layer on the surface of the medical device;

immobilizing the anti-thrombogenic material directly to chemically functional groups within the base coat layer on the surface of the medical device; and

performing a carbodiimide-mediated reaction to form an amide linkage to a chemical chain of the anti-thrombogenic material attached to the base coat layer.

40. The method of claim 39, wherein the anti-thrombogenic material is heparin.

41. The method of claim 39, wherein the carbodiimide reaction is between Superoxide dismutase mimetic (SODm) and heparin.

42. The method of claim 41, wherein SODm is grafted to the chemical chain of heparin through the carbodiimide reaction.

43. The method of claim 41, wherein SODm is reacted with heparin and EDC at about room temperature and about pH 7.0 for about four hours.

44. The method of claim 43, wherein heparin includes an aqueous heparin solution.

45. The method of claim 39, wherein the carbodiimide-reacted anti-thrombogenic material includes SODm-heparin.

46. The method of claim 45, wherein SODm-heparin is end-immobilized in a reaction with chemically functional groups of the base coat layer on the surface of the medical device.

47. An implantable medical device having a base coat with an anti-thrombogenic material immobilized thereto, comprising:

a base coat layer posited on the medical device;

wherein the anti-thrombogenic material is immobilized directly to chemically functional groups within the base coat layer on the surface of the medical device.

48. The implantable medical device of claim 47, wherein the medical device is a stent.

49. The implantable medical device of claim 47, wherein the base coat layer covers the outside surface of the medical device.

50. The implantable medical device of claim 47, wherein the base coat includes a binding material, a grafting material, a photoinitiator, and a solvent.

51. The implantable medical device of claim 50, wherein the binding material of the base coat is selected from the group consisting of polyaziridine resin compounds, polycarbodiimide resin compounds, aldehyde compounds, oxirane compounds, acetoacetoxy compounds, and isocyanate compounds.

52. The implantable medical device of claim 51, wherein the binding material of the base coat is cinnamaldehyde.

53. The implantable medical device of claim 50, wherein the grafting material of the base coat is selected from the group consisting of vinyl, acrylate and allyl compounds.

54. The implantable medical device of claim 53, wherein the grafting material of the base coat is polyurethane acrylate.

55. The implantable medical device of claim 54, wherein the grafting material of the base coat is polymerized by irradiating the grafting material with ultra-violet (UV) radiation for about eight to ten minutes.

62. The implantable medical device of claim 61, wherein the anti-thrombogenic material is heparin.

63. The implantable medical device of claim 61, wherein heparin is end-immobilized by a reaction between an amine-terminated heparin and chemically functional groups within the base coat layer on the surface of the medical device.

64. The implantable medical device of claim 63, wherein the reaction between the amine-terminated heparin and the chemically functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 7.0.

65. An implantable medical device having a base coat with an anti-thrombogenic material immobilized thereto, comprising:

a base coat layer posited on the medical device;

the base coat layer and excess amine-terminated polyethylene glycol are reacted on the surface of the medical device with the chemically functional groups of the base coat layer;

the base coat layer is rinsed in water; and

wherein the anti-thrombogenic material and amine-terminated polyethylene glycol are reacted on the surface of the medical device with the chemically functional groups of the base coat layer.

66. The implantable medical device of claim 65, wherein the reaction between the excess amine-terminated polyethylene glycol and the chemically

functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 7.0.

67. The implantable medical device of claim 66, wherein the excess amine-terminated polyethylene glycol is $PEG(NH_2)_2$.

68. The implantable medical device of claim 67, wherein the concentration of $PEG(NH_2)_2$ is about 0.01mg/ml to 20mg/ml.

69. The implantable medical device of claim 66, wherein after completion of the reaction between the excess amine-terminated polyethylene glycol and the chemically functional groups within the base coat layer, the medical device is rinsed with water.

70. The implantable medical device of claim 65, wherein the anti-thrombogenic material is unfractionated heparin.

71. The implantable medical device of claim 70, wherein unfractionated heparin is reacted with amine-terminated polyethylene glycol and a water-soluble carbodiimide on the surface of the medical device for the immobilization of heparin thereon.

72. The implantable medical device of claim 71, wherein the reaction between unfractionated heparin and amine-terminated polyethylene glycol with a water

soluble carbodiimide on the surface of the medical device runs for about two to six hours at about room temperature and about pH 4.5 to 7.5.

73. The implantable medical device of claim 65, wherein the anti-thrombogenic material is N-desulfated heparin.

74. The implantable medical device of claim 73, wherein N-desulfated heparin is reacted with amine-terminated polyethylene glycol and a water-soluble carbodiimide on the surface of the medical device for the immobilization of heparin thereon.

75. The implantable medical device of claim 74, wherein the reaction between N-desulfated heparin and amine-terminated polyethylene glycol with a water soluble carbodiimide on the surface of the medical device runs for about two to six hours at about room temperature and about pH 4.5 to 7.5.

76. An implantable medical device having a base coat with an anti-thrombogenic material immobilized thereto, comprising:

a base coat layer posited on the medical device;

wherein a reaction occurs between a coupling solution and chemically functional groups within the base coat layer of the device surface.

77. The implantable medical device of claim 76, wherein the coupling solution is heparin and OH-PEG-NH_2.

78. The implantable medical device of claim 77, wherein the concentration of the coupling solution is about 0.01mg/ml to 20mg/ml.

79. The implantable medical device of claim 77, wherein the reaction between the coupling solution and chemically functional groups within the base coat layer runs for about eighteen to twenty-four hours at a temperature in the range of 15°C to 80°C and about pH 8.0.